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Effects Of Interspersing On Peer Tutoring Of Sight Words

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Effects of Interspersing on Peer Tutoring of Sight Words

BY

Jennifer Schultz

THESIS

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Abstract

This study investigated the effects of short-term peer tutoring, with interspersal or without interspersal, on sight word acquisition. Four first grade students and two second grade students participated in the study. Student dyads (i.e., 1 tutor and 1 tutee) were either in the without interspersal condition or in the interspersal condition. Using an AB single case design, student performance was measured and graphed in two ways, cumulative learning and student learning rate. Contrary to expectations, results indicated the overall cumulative learning measurement for students in the without interspersal condition acquired the greater number of words learned, required less instructional time, and had higher learning rates. Similar results were found for their maintenance data. Discussion focuses on limitations of the current study and implications for future research.

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Literature Review

Fluency

One important purpose of education is to provide students with the knowledge and skill acquisition they need to be successful (Naglieri, 2002). Skinner, Fletcher, and Henington (1996) have stated that sometimes slower responding is a result of skills deficits that prevent students from responding fluently or automatically. Fluency, in relation to academic skills, is the ability to perform a skill in a fast, effortless manner. If academic skills such as reading, writing, and arithmetic are to be functional, students must be able to respond accurately and fluently across different academic stimuli (Skinner, 1998). Therefore, the students who most need additional drill and practice trials to increase their fluency are likely to complete fewer drill responses than students who already have obtained some degree of fluency.

An example of this is a student who is a slow reader and must sound out many words. They will not read as many words as their peers who are fluent in reading and, in addition, their cognitive energies may be drawn away from the meaning of the words, which in turn may compromise their comprehension (National Reading Panel, 2000). It is therefore paramount that reading instruction and remedial strategies emphasize the building of fluency in reading; that is, developing the speed with which words can be identified accurately. Two ways to provide practice in developing fluency are peer tutoring and interspersing procedures. This thesis will focus on these two procedures and how they may work in concert to produce increases in word recognition fluency.

Peer Tutoring

An intervention that offers an increased opportunity to make responses and includes immediate correction of errors is peer tutoring. Peer tutoring is defined as the pairing of two students (a dyad)–one of whom is competent in a skill or procedure and one who is less competent–to enhance and extend academic instruction (Mercer, 1992). Greenwood, Delquadri, and Carta (1997) maintain that teachers find peer tutoring valuable because it is adaptable to any teaching style and curriculum, easy to implement, cost effective, time efficient, and effective with all ability levels.

Delquadri, Greenwood, Stretton, and Hall (1983) identified variables that accounted for the effectiveness of peer tutoring that included having an increased opportunity during peer tutoring to make correct responses, immediate correction of errors through an efficient error correction procedure, and immediate reinforcement of correct responses and error corrections. Effective class-wide peer tutoring interventions consist of components such as being highly structured, being carefully monitored by a teacher, and the participants knowing who their partner is and the logistics of the intervention (Greenwood, Carta, & Kamps, 1990, as cited in Madrid, Terry, Greenwood, Whaley, & Webber, 1998).

In addition to enhancing academic instruction, peer tutoring has been shown to have positive effects on both the tutor and the tutee (Coenen, 2002; Greenwood, Delquadri, & Hall, 1989; Madrid, et al., 1998; Nazzal, 2002). Current research has indicated that students who have participated in peer tutoring programs at school are likely to be more successful in school (Coenen, 2002; Nazzal, 2002). A study by Nazzal (2002) stated that students who view school as relevant to their lives, view themselves as

successful in school, and who have positive feelings of belonging in the school have been identified as more likely to remain in school, despite other factors that put them at-risk for dropping out of school.

A study by Coenen (2002) examined how using gifted students as peer tutors affected students who have been referred for help with organizational skills and completion of academic class work. Results showed that tutees completed more work, learned how to fill out a daily planner, developed positive study habits, and improved academic grades. In addition, tutors improved leadership skills, limit-setting ability, and patience.

In addition to peer tutoring being an effective methodology for helping individual students succeed academically, it can also be tailored to accommodate an entire classroom. Research examining the effectiveness of class wide peer tutoring (CWPT) has shown that it has positive effects on students' academic performance and is an efficient and resourceful method of instruction for teachers (Arreaga-Mayer, 1998; Greenwood, et al., 1989; Madrid, et al., 1998). CWPT has been demonstrated to promote mastery, accuracy, and fluency in content learning for students with and without disabilities (Arreaga-Mayer, 1998).

Another advantage of CWPT is its effectiveness relative to teacher-mediated instruction. Students that have received CWPT instruction for an extended period of time have indicated greater gains in academic performance when compared to students taught with only teacher-student interaction methods of instruction. For example, Greenwood, et al., (1989) examined the longitudinal effects of CWPT with an experimental group of low socioeconomic students (SES) students. These students received CWPT during each

grade from first through fourth, while a low SES control group and a high SES comparison group received only teacher-designed instruction. Results of this study indicated that the experimental group and the comparison group produced significantly greater product gains than did the control group. The experimental group data suggests that they engaged in relatively higher levels of specific academic behavior (oral reading, academic talk, and question asking) and less time raising hands for assistance because assistance was readily available to them compared to the control and comparison groups. The comparison group data suggested that the comparison group classrooms used smaller group instruction, more individualized seatwork, and more independent study. They also spent less time than controls engaged in hand-raising behavior. The process data for the control group indicated that these students spent more time in directed, teacher-student interaction methods of instruction and in nonacademic activities dealing with class business. Also, students in the control group spent more time engaged in hand-raising behavior and less time engaged in academic behaviors.

There has also been research conducted that has assessed the effectiveness of peer versus teacher delivered instruction on acquisition and maintenance of academic skills. Miracle, Collins, Schuster, and Grisham-Brown (2001) compared the effectiveness of peer versus teacher delivered instruction when teaching basic sight words, or the most common words that appear in print, with a constant time delay procedure to secondary students with moderate/severe disabilities. The constant time delay procedure entailed transferring stimulus control from the controlling prompt (e.g., verbal model of the word) to a natural stimulus (e.g., written sight word) by delaying the prompt for approximately three seconds following the presentation of the natural stimulus. The results of this study

showed that while both modes of delivery were effective, teacher instruction was slightly more efficient on the acquisition of sight words than peer tutor instruction. The explanation for this may be the possible differences in the teacher's style of delivery (i.e. body language, voice tone, enthusiastic reinforcer delivery) that may have affected delivery. The teacher did note that the peer tutors tended to use a monotone voice and repetitive statements in delivering reinforcement for correct responses.

In addition to the research on sight word reading skills, there has also been research done on the effectiveness of different types of spelling instruction, using peer tutoring and teacher-mediated instruction. Madrid, et al., (1998) examined the rate of correct spelling responses and generalization responses of 16 African-American first grade children who were identified as being at risk for school failure. Participants were given weekly spelling tests under three instructional conditions: a) active peer tutoring, which required tutors to read a list of ten spelling words to tutees and the tutees would write each word and at the same time spell the word out loud; b) passive peer tutoring, which required the tutee to observe and listen as the tutor wrote each spelling word and spelled it out loud; and c) teacher-mediated instruction, which required tutors and tutees to follow teacher-developed spelling lesson plans which minimized all overt peer interactions. The curriculum employed in the study consisted of 120 words drawn from the basal second-grade-level text for spelling. These words were used during the experiment and an additional 60 words were selected for use during generalization probes. The experimental and generalization words contained similar but different words. The generalization words were sound matched with the words that were trained during the experiment. For example, the second-grade-level spelling word "candy" was used, or

trained, during the experiment. The sound match generalization word (i.e., not trained) was "handy." The generalization words were randomly selected by the researchers.

Pretest probes for the following week were administered to the children on Friday. Posttest and generalization probe sessions were also held on Friday but only after the pretest probe sessions had been held. All pretest and posttest probes consisted of ten training words and each generalization probe consisted of five untrained words. Results of this study indicated that a) both peer tutoring procedures produced superior spelling posttest scores than the teacher-mediated instruction; b) passive peer tutoring yielded levels of spelling performance equivalent to active peer tutoring; and c) correct generalization responses appeared to occur at an equal rate across the three instructional conditions.

Logistical Concerns of CWPT

Although the studies that have been conducted on peer tutoring have indicated that it is an effective intervention for academic instruction (Arreaga-Mayer, 1998; Coenen, 2002; Greenwood, et al., 1989; Madrid, et al., 1998; Nazzal, 2002), one should keep in mind an important limitation of peer tutoring. Specifically, when class wide peer tutoring is implemented, it is difficult to observe all of the dyads at the same time to ensure treatment integrity. Even though a teacher may be present in the classroom during the time peer tutoring is being conducted, it is very unlikely that the teacher will be able to oversee how all students are implementing the intervention. Therefore, before implementing peer tutoring, it is crucial that everyone involved in implementing the intervention understands the procedures and is able to demonstrate their ability to reliably implement the procedures.

Fulk and King (2001) have examined the steps for implementing CWPT. After students are familiar with the procedures, the teacher should then select the optimal content to be covered. Standardized, commercially prepared materials or teacher-made materials can be used. Selecting materials of the proper difficulty level is key. If the materials used are self-correcting (flashcards with the answers available) students can be paired regardless of skill level. Students can be paired based on ranking their achievement (high to low) by dividing the list in two and pairing the first student in list one with the first student in list two and so on. Attention should also be paid to how compatible the students are socially. When teams are used it is recommended that pairs be rotated frequently in order to encourage active participation of all members. Students should be trained in the roles of tutor before peer tutoring is implemented. The teacher can demonstrate the role of the tutor so students learn how to ask questions and deliver content appropriately. Delivering positive feedback and correction should be reviewed, practiced and reinforced.

Once these pre-treatment logistics are worked out, the following logistical concerns should be attended in a manner appropriate to the individual classroom implementing CWPT. CWPT sessions are generally 15-30 minutes in length depending on the content. The session begins when the tutor asks the tutee a question or points to a flash card. Next the tutee provides an oral or written response. With each correct response the tutor provides verbal reinforcement ("That's right!"). When the response is incorrect the tutor provides the correct response and the tutee practices the correct response.

Summary of Peer Tutoring Literature

Peer tutoring has been demonstrated to be an effective method of instruction (Arreaga-Mayer, 1998; Greenwood, et al., 1989; Madrid, et al., 1998; Nazzal, 2002). The main effectiveness components of tutoring programs have been delineated as; a) tutoring activities are highly structured, b) teachers carefully monitor tutoring behaviors, c) tutoring participants receive specific training regarding tutoring procedures, d) prior to specific tutoring sessions, students know who their tutoring partner is, the specific academic material to be learned, and appropriate correction procedures, and e) during tutoring sessions, teachers monitor student-tutoring activity and provide feedback on proper procedures and mastery level (Greenwood, et al., 1990, as cited in Madrid et al., 1998)

Peer tutoring has been shown to be an effective intervention for enhancing students' academic performance because it offers an increased opportunity to make responses and includes immediate correction of errors (Arreaga-Mayer, 1998; Coenen, 2002; Greenwood, et al., 1989). Peer tutoring has been shown to have positive effects on all participants involved (Arreaga-Mayer, 1998; Coenen, 2002; Greenwood, et al., 1989; Madrid, et al., 1998; Nazzal, 2002). Such positive effects include positive effects on tutors' academic performance, perceptions of success in school, and perceptions of ability (Nazzal, 2002). In addition, peer tutoring has also been shown to be an efficient instruction method for teachers (Greenwood, et al., 1989; Madrid, et al., 1998) and in some instances superior to teacher-mediated instruction (Greenwood, et al., 1989). These findings have been replicated across ethnicities (Madrid, et al., 1998), and across content (Arreaga-Mayer, 1998; Madrid, et al., 1998).

Maheady, Harper, and Mallette (2001) have identified four basic conclusions regarding the use of peer-mediated instruction (PMI). First, they concluded that peer-teaching strategies should be applied on a broader and more routine basis in schools, particularly within classrooms for children with significant academic and behavioral challenges. Second, they cited a database which showed that PMI produced noticeable pupil improvements in three distinct but interrelated domains (academic, interpersonal, personal/social development). Third, peer-teaching strategies have worked because they establish more favorable pupil-teacher ratios within the classroom, increased student on-task time and response opportunities, and provided additional opportunities for pupils to receive positive and corrective feedback and to receive individualized help and encouragement. And lastly, though there may be various predictable concerns that teachers may have to address such as increased noise levels and logistical problems (i.e. pupils complaining about partners, pupils not working collaboratively, tutors' instructional integrity), these concerns can be remedied by using specific strategies to address these issues. Using PMI with students, especially those with disabilities may provide teachers with a vehicle for actively engaging pupils in their own learning.

Interspersing

Like peer tutoring, another academic intervention that has been shown to increase the amount of learned material is interspersing. Interspersing is a modification of the curriculum in which brief, additional material is interspersed among considerably longer target material (Cates & Dalenberg, in press). Research has indicated that interspersing brief review material among longer target material has increased the acquisition and retention of learned material (Neef, Iwata, & Page 1977; 1980). Neef, et al., (1977)

studied the effects of interspersing known items during training on new tasks. Six mentally retarded adolescents were given pretests on spelling and sight-reading words, which were divided into two categories consisting of known or unknown words. During the interspersal training sessions, 10 known words from the pretest were alternately presented with each of 10 test words that were incorrect on the pretest. The ratio of previously mastered words to test words was gradually reduced. During baseline sessions, 10 different test words were presented without interspersed known words. During this condition, a procedure involving high-density social reinforcement contingent on task-related behaviors, but not necessarily correct responses, was later introduced, followed by a return to the original baseline. In regards to this study, high-density social reinforcement was defined as approximately 10 statements relating to the on-task behaviors of the participants and was delivered for such task-related behaviors as paying attention, writing neatly, and trying hard. During the experiment, unknown words that were newly mastered were deleted and replaced with a new unknown word. Retention tests were administered over learned test words for all conditions at specified intervals. Results showed that the acquisition and retention of spelling and sight-reading words were facilitated by the interspersal procedure.

In a similar study, Neef, et al., (1980) replicated the same previously mentioned design and procedures with three male students with mental retardation. The students during the baseline condition were given 10 test words per session. During interspersal training sessions, previously mastered words were interspersed among the 10 test words. During high-density reinforcement sessions, 10 test words were presented with additional reinforcement provided for task-related behaviors. Retention tests were administered

throughout the study over mastered words and a cumulative retention test was administered at the end of the experiment. Results indicated that high-density reinforcement did facilitate performance over baseline. However, interspersal training was superior to the other conditions in terms of both acquisition rate and short-and long-term retention. Also, students preferred the interspersal condition when given a choice.

Effects of Interspersing on Behavior

Neef, et al., (1977, 1980) have demonstrated that interspersing brief, additional material can increase the acquisition rate and retention of learned material. However, their research also indicates that students may prefer assignments with interspersed review material. Because students' productive behavior may be related to preferences for academic tasks (Cates & Dalenberg, in press; Dunlap & Kern, 1996; Robinson & Skinner, 2002; Skinner, 2002; Skinner, Fletcher, Wildmon, & Belfiore, 1996), interspersing has been investigated with regard to its effects on student behavior. McCurdy, Skinner, and Grantham (2001) exposed a fourth-grade student referred for elevated levels of off-task behavior during independent seatwork to experimental and control mathematics assignments. The control assignments consisted of problems reflecting the current mathematics curriculum of place values, money values, and simple fractions. The experimental, or interspersal assignments, were constructed by the primary experimenter. These assignments contained identical problems from the students' workbook and additional, briefer, and possibly easier problems followed every third target or control problem. Results yielded support for the notion that interspersing additional brief problems could be used to increase the on-task behavior of an elementary school student during independent seatwork activities.

Research supports the notion that the interspersal of brief instructional review material may decrease off-task behavior in the classroom (McCurdy, et al., 2001). Dunlap and Kern (1996) have summarized previous studies and stated that there is an integral relationship between context and consequence that is demonstrated in the common scenario in which a student engages in disruptive behavior in order to solicit a teacher's attention. The teacher's attention only serves as a reinforcer under conditions of relative deprivation. If the antecedent and contextual conditions provide an ample supply of relevant attention, this disruptive behavior will not occur. Disruptive behavior will also be unlikely to occur if the student has access to other kinds of rewards (e.g., peer attention, interesting materials) that are readily available and that support desirable behavior. Students may also engage in problem behaviors in order to escape (or avoid) the presence of demands or particular classroom assignments that the students finds aversive. A vital element in this proposition is that in some way the student experiences the context of the assignment to be unpleasant enough to engage in problem behavior that carries a probability of producing escape from the assignment. It can be assumed that a different review (earlier) assignment would not produce the same pattern of responding.

Studies by Horner, Day, Sprague, O'Brien, and Heathfield (1991) have been conducted to determine if a functional relationship exists between the use of interspersed, high-probability requests and the likelihood that students will attempt to complete a difficult task or engage in self-injury when presented with difficult tasks. One study examined these variables among three adolescents living in a community-based group home that had a history of self-abuse, aggression, or destructive behavior during instruction. Staff members were asked to identify two tasks from current individualized

plan objectives for each participant. An easy task was operationally defined as a task in which 70% or more of the trials were performed correctly without trainer assistance. A hard task was operationally defined as a task in which 33% or fewer of the trials within a session were performed correctly without trainer assistance. The dependent variables were aggression or self-injury and attempting to complete the task. There were three conditions in the study; a) easy phase in which the participants engaged in a simple task and were reinforced after approximately every three correct trials, b) a hard phase which replicated the procedures in the easy phase except that the tasks were more difficult, and c) hard and interspersed requests phase in which at the beginning of each training session, after about every three training trials and following any indication of resistance, the trainer interspersed three to five short, simple requests. Results yielded strong support for a functional relationship between use of interspersed requests and reduced levels of aggression or self-injury.

Another study by Horner et al. (1991) replicated the same design and procedures as the previously mentioned study with a fourteen-year-old male with mental retardation, who demonstrated aggressive behaviors (kicking, hitting, etc.) during instruction time within a self-contained classroom. Results showed that the participant was more likely to be aggressive towards the teacher when difficult tasks were presented. This changed when interspersed requests were used in conjunction with hard tasks.

Effects of Interspersal on Assignment Preference

Research by Skinner (2002) has explored how procedures can be designed to increase the probability of students choosing to engage in assigned academic behavior can enhance learning rates and decrease inappropriate classroom behavior. Skinner

(2002) has explained how students are more likely to engage in academic assignments by developing the discrete task completion hypothesis. The hypothesis is based on the assumptions regarding a student's history of reinforcement for academic behavior. Many academic assignments contain discrete tasks that students complete at their own pace (e.g., independent seatwork with 20 mathematics problems). Consequences are often delivered contingent upon a student's response to assignments. After completing the assignments, the students may be given positive reinforcers such as praise, tangible reinforcers, or permission to do preferred activities (read, work at the computer, etc.). If each completed discrete task, or each completed problem, is a reinforcing stimulus, then increasing task completion rates should increase rates of conditioned reinforcement.

Therefore, it is suggested that students will be more inclined to choose an assignment with easier problems interspersed because the rate of reinforcement will be greater (Dunlap & Kern, 1996; Skinner 2002). A study by Skinner, Fletcher, Wildmon, and Belfiore (1996) examined student assignment preference among 53 undergraduate students enrolled in an educational psychology course. The students were exposed to a control mathematics assignment containing three-digit by two-digit multiplication (3X2) problems and two experimental assignments that contained 16 equivalent 3X2 problems and six additional interspersed problems. On one experimental assignment, 4-digit plus 4-digit problems (4+4) were interspersed. On the other experimental assignment, 2-digit divided by 1-digit with whole number answers problems (2/1) were interspersed. Results showed that when given a choice, significantly more students choose the 2/1 assignment over the control and the 4+4 assignment. Students also ranked the 2/1 sheet as requiring less time to complete than the control or 4+4 assignment but no differences were found in

assignment difficulty rankings between the 4+4 and 2/1 assignments. No differences were found on accuracy levels or rates of responding on the target 3X2 problems across assignments.

Research in this area has also yielded results that do not support the hypothesis that the interspersal of brief, simple items positively influences choice and perceptions of students. Robinson and Skinner (2002) administered altered and original forms of multiplication subtests and a mental computation (subtraction) subtest to 30 7th-grade students attending a rural, southern high school. Results did not find significant differences on performance between the experimental and control forms of the multiplication subtest. Students did obtain higher scores on the form of the mental computation subtest that contained additional, interspersed subtraction problems than with the original format. For the multiplication subtest, the students were able to complete the problems at their own pace unlike the mental computation subtests, which were timed. Another explanation for the performance differences is instructional level. The students may not have been as fluent at solving problems without pen and paper. Overall, results from the choice data did not support the hypothesis that the interspersal of brief, simple items would positively influence choice and perceptions as were found in previous research (e.g., Cates & Dalenberg, in press; Skinner, et al., 1996).

A study by Martin, Skinner, and Neddenriep (2001) had 48 seventh-grade-students read aloud both a control passage and a similar experimental passage that contained additional interspersed brief and easy paragraphs. Students were then told to select what they thought would require the least effort to read and the least time to read. Students were also told to pick the passage they liked most and the passage that they

would like to read again. Results yielded no differences among the control and experimental passages regarding preference, choice, or effort selections.

Research has yielded conflicting results about how interspersing has been shown to have an effect on students' choice and perception of assignments (Martin, et al., 2001; Robinson & Skinner, 2002; Skinner, et al., 1996). However, the working hypothesis on why interspersing works seems to be supported (Cates & Dalenberg, in press; Skinner, 2002).

Research by Cates and Dalenberg (in press) investigated how interspersing effects are consistent with the effects of reinforcement in predicting students' preferences for mathematics assignments. Participants were 60 undergraduates enrolled in various psychology courses from a Midwestern university. Students were presented with four assignment pairs (i.e., a control assignment and an experimental assignment). Each of the four control assignments contained 15 problems requiring the multiplication of a three-digit number by a two-digit (3X2) number. Each control assignment was paired with an experimental assignment that also contained 15 problems requiring the multiplication of 3X2 problems. The experimental assignments differed from the control assignments in that additional brief one digit by one-digit (1X1) multiplication problems were interspersed at various fixed ratio (FR) schedules throughout the experimental assignments. The ratios were no interspersing (FR0), interspersing every other problem (FR1), interspersing every third problem (FR3), or interspersing every fifth problem (FR5). Results indicated that interspersing brief items on an FR1, FR3, and FR5 schedule resulted in significant increases in total problem completion rates without affecting accuracy of the target problems. Interspersing did not result in a decrease of target

problem completion rates with the exception of the FR1 schedule. Results also suggested that as interspersing rates increased, students were more likely to indicate that assignments were less difficult, less time consuming, less effortful, and they preferred them for homework.

The Cates and Dalenberg (in press) study suggests that the interspersal rates of additional, briefer items within an assignment increases problem completion rates. Roberts, Turco, and Shapiro (1991) explored whether differential instructional ratios (i.e. interspersing review among to be learned material) of known/unknown words increased learning of vocabulary words during a drill procedure in reading. The participants were 42 average second-through fifth-grade students who obtained a reading score on the California Test of Basic Skills in the average to low average range. A flashcard drill intervention was implemented that presented known and unknown words under one of four treatments: a) 90% known to 10% unknown words; b) 80% known to 20% unknown words; c) 60% known to 40% unknown words; d) 50% known to 50% unknown words. Pre- and post-test data were obtained on oral reading fluency, comprehension, and reading from grade-level vocabulary word lists. Bi-weekly curriculum-based measurement probes were also administered. At the end of the eight-week daily drill intervention, results suggested that those students in the 50:50 and 60:40 conditions moved through more instructional material in the same amount of time than did students in the other two ratio conditions. However, the students in the conditions with the lowest number of unknown (90:10, 80:20) words showed the greatest amount of learning beyond what was taught. These results suggest that though the acquisition of new words occurred under conditions in which as much of 50% of the material is unknown, the amount of

learning may be greater than what is taught in conditions in which only 10% or 20% of the material is unknown.

Another study by Roberts and Shapiro (1996) was conducted to extend upon the work of the previous study by Roberts, et al., (1991). The effectiveness of different instructional ratios of known to unknown vocabulary words was examined on the reading progress of second grade students from an inner-city elementary school. The four experimental were: a) 80% known words: 20% unknown words; b) 50% known: 50% unknown; c) 20% known: 80% unknown; and d) an assessment-only group. The differences on dependent measures across the four experimental conditions were evaluated at the end of a seven-week drill intervention. Results indicated that the students acquired more new information when instructional ratios were 20% known: 80% unknown. These results support the notion that having a greater ratio of unknown words to known words does in fact increase the material acquired, which supports the results of the previous study (Roberts, et al., 1991).

Summary of Research on Interspersing

Overall, research on the interspersal of brief, additional material has indicated that it increases opportunities to respond (Cates & Dalenberg, in press; Skinner, 2002) and increases the amount of material learned (Neef, et al., 1977; 1980; Roberts & Shapiro, 1996; Roberts, et al., 1991). Interspersing has also been shown to effectively decrease off-task behaviors in the classroom (Horner, et al., 1991; McCurdy, et al., 2001) and influence student ratings of assignments (Cates & Dalenberg, in press; Neef, et al., 1980; Skinner, et al., 1996).

Dunlap and Kern (1996) have stated that if reinforcement is readily available, the student will be less likely to engage in disruptive behaviors for reinforcement (e.g., teacher attention). Or, a student that engages in problem behaviors may be trying to escape (or avoid) the presence of demands or particular classroom assignments that the students finds aversive. A student who perceives the task as pleasant will be less likely to engage in problem behavior.

Skinner (2002) has explained that students are more likely to engage in academic assignments that have additional, brief material interspersed because each completed problem, or discrete task, is a reinforcing stimulus. It is suggested that if the student in some way experiences the context of the assignment to be pleasant enough to engage in on-task behavior that carries a probability of producing more opportunities to respond (Dunlap & Kern, 1996; Skinner 2002).

However, there are some limitations noted throughout the studies on interspersal. Research on interspersing has not shown that it consistently increases acquisition or affects the accuracy of responding (Skinner, et al., 1996). Another caveat is that the teacher has to modify the instructional material to include the additional brief material. This would require more time, effort, and resources on the behalf of the teacher.

Overall Summary

Opportunities to respond are important because they promote the acquisition, maintenance, and generalization of skills and enhance fluency (Skinner, 2002; Skinner, et al., 1996). Opportunities to practice have been incorporated in interspersing procedures (Horner, et al., 1991; McCurdy, et al., 2001; Neef, et al., 1977; 1980; Roberts & Shapiro, 1996; Roberts, et al., 1991; Skinner, 2002). For example, Roberts, et al., (1991) and

Roberts and Shapiro (1996) have shown that having a greater ratio of unknown vocabulary words to known vocabulary words does increase the amount of material learned. By using a drill procedure along with interspersed material, students may have increased opportunities to respond and will be exposed to more material to be learned.

In addition to interspersing, similar results can often be obtained by employing a peer tutoring procedure. Peer tutoring has been shown to be an effective intervention for enhancing students' academic performance because it offers an increased opportunity to make responses and includes immediate correction of errors (Arreaga-Mayer, 1998; Coenen, 2002; Greenwood, et al., 1989). It is apparent that both interspersing and peer tutoring are empirically supported methods of instructional delivery. However, research has not indicated the extent to which these two procedures can work together to enhance learning. By combining interspersal and peer tutoring interventions, students may demonstrate greater gains in learned material and accuracy of responses.

The purpose of this study is to expand on the findings by Roberts, et al., (1991) and Roberts and Shapiro (1996) who found that greater ratios of unknown to known words increased the material acquired by second through fifth grade students. This study will incorporate interspersal with a peer tutoring intervention in an attempt to increase sight word acquisition among first grade students.

Research Questions

This study seeks to answer three primary questions. First, this study will attempt to determine which condition (peer tutoring or peer tutoring with interspersing) is more effective in increasing sight word acquisition. Second, this study will examine if there is a difference in the learning rate of sight words, or number of words mastered per minute of

instruction, between the conditions. And lastly, this study will attempt to determine if there is a difference between the conditions in the percentage of sight words maintained.

Method

Participants and Setting

Participants were four first grade students and two second grade students enrolled in regular education classrooms in a mid-western suburban elementary school. Participants were recruited by first obtaining approval to conduct this study from the Eastern Illinois University's Ethics Committee and the grade school administrators (See Appendix A). The researcher approached the second grade teachers of the elementary school about the study. After receiving written consent from one of the second grade teachers (See Appendix B), the researcher explained the logistics of the study to the teacher. The teacher and researcher randomly selected and obtained written consent from parents of two students (See Appendices C and D) in the teacher's class who demonstrated stronger reading skills when compared to other students in the class to participate as student tutors in the study. The researcher then approached the first grade teachers about the study. After obtaining written consent from a first grade teacher, the researcher and the teacher randomly selected and obtained written consent from parents of four students (See Appendices C and D) in the teacher's class who demonstrated weaker reading skills than other students in the same class. These four first grade students were the tutees.

Materials

The materials that were used in the study included the Fry Instant Word List (1980) (See Appendix E), a stopwatch, and 3 X 5 inch index cards used to model the

sight words. The Fry Instant Word List (1980) was used in this study because it consisted of the 300 most common words that appear in print. The words each student read correctly or incorrectly prior to beginning the study determined which words were given during the intervention. A check sheet was used to record the tutees' responses during the intervention.

Procedure

Prior to beginning the study, the six students were taken aside individually and were administered the 300 words of the Fry Instant Word List (1980) to assess which sight words they knew and which they did not know. The researcher had the sight words printed on a sheet of 8 1/2 X 11 inch white paper. The sight words were divided into three sections, each containing one hundred words. Each section of a hundred words consisted of six columns with 17 sight words in each column. As the researcher pointed to each word, the student was instructed to try his or her best to read each word. When assessing the second grade students, the researcher put a checkmark next to the words that the students pronounced incorrectly and did not put a marking next to the words they pronounced correctly. However, when assessing the first grade students, the researcher had to reverse this procedure because the first grade students did not know many of the sight words presented. Therefore, the researcher put a checkmark by the words the students did know and did not put any markings by the unknown words. Words pronounced correctly were considered "known" words and words that did not evoke a response or were mispronounced were considered "target" words (sight words that have not yet been mastered). The sight words not known to the tutors were not used in the study because the tutor had to know the correct pronunciation of the sight words that

would be presented to the tutees in order to determine if the tutee was reading the words correctly or incorrectly. Both the tutee's known and target sight words were used in the study.

After the students were assessed and the lists of known and unknown sight words were obtained for each tutee, the researcher printed the sight words on the middle of the index cards using 24 point times new Roman black font for both lists. During the peer tutoring sessions, the tutors would hold up a flash card with a sight word on it and the tutees were told to read the word out loud. All correct responses were followed by verbal praise from the tutor (e.g. "Good!" or "That's Right!"). If the tutee failed to respond within five seconds or responded incorrectly, the tutor would read the word and the tutees were instructed to repeat the correct reading once. Each tutor was randomly assigned to two tutees (i.e. dyads).

Experimental Conditions

Dyads were randomly assigned to one of two conditions. Each tutor used word lists with interspersed known words with one of their peer tutoring dyads. The tutor's other peer tutoring dyad had word lists without interspersed known words. The students in the peer tutoring without interspersal condition received sight word lists that consisted of ten randomly assigned unknown words (0 known and 10 unknown words). The students in the peer tutoring with interspersal condition received sight word lists that consisted of ten randomly assigned unknown words with a known word interspersed after every unknown word (10 known and 10 unknown words or 50% known: 50% unknown). The interspersed word lists began with a known word.

Experimental Design and Experimental Procedures

An AB single case design was used to compare the two conditions: peer tutoring of sight words with interspersal of known words and peer tutoring of sight words without interspersal of known words. Experimental sessions were conducted on five school days for a total of five sessions. Sessions were conducted approximately twice a week. Each session for both conditions lasted approximately ten minutes. Each tutee was exposed to one of the two sight word list conditions (with or without interspersed known words). Each tutor had one tutee in the interspersal condition and one tutee in the condition without interspersal. Tutees were randomly selected for each condition. The tutors gave the tutees who were in the same condition their list at the same time. Both students in each tutoring condition ended their tutoring sessions at the same time due to each student in that condition having the same number of words in their respective lists (i.e., the two students in the interspersal dyad had 20 words while the two students in the without interspersal dyad had 10 words). During each session, the tutees were exposed to their respective list of sight words three times. After the tutee completed the list three times, they raised their hand. The researcher used a stopwatch to measure the number of seconds it took for each tutee to complete the list. The researcher marked the time next to the session number on a daily check off sheet (Appendix F).

The researcher had access to an unoccupied classroom with enough desks and chairs for the participants. The researcher set up the room so that the tutors faced their tutees across a desk in a room. The peer tutor would hold up the 3X5 flashcards with sight words printed on them towards the tutee. The tutee was expected to say the word within five seconds. Correct responses under both conditions were followed by verbal

praise (e.g., "Good!" or "That's Right!") and then the tutor presented the next word. If the tutee did not respond within five seconds or responded incorrectly, the tutor then said the word and then prompted the tutee to repeat the correct pronunciation one time. As the tutors presented the sight words to the tutees, the researcher sat in a chair behind them and used a check off sheet to record the tutees' performance. On the sheet, the researcher circled the letter C if the tutees' pronounced the words correctly, circled the letter X if the tutees' incorrectly pronounced a word, and circled the letters NR if the tutee did not respond. There were three columns on a page to account for each trial. The tutors paused briefly after each word was presented to allow the researcher time to record the tutee's answers on the check off sheet. After the tutees received their respective word list three times, they were returned to their class's current activity and the tutors' other student tutees' were then brought to the classroom where the study was taking place to be given their respective word list three times.

Target words, or unknown words, were considered to be mastered when the student's initial response was correct across all three trials during a session. All newly mastered words were removed from the respective list and were replaced with new randomly chosen target words from the entire Fry Instant Word List (1980) which were included in the next session's procedures. Words not mastered continued to be included as unknown in the next session. Within the interspersal condition, when a word was shifted from unknown to known status, it moved to the known pile and the known words that had been on the students' list for at least three sessions were randomly selected and removed and replaced by a new known word.

Maintenance

Two days after the final day of intervention, all of the tutees were taken aside individually and were asked to read their list of known words to the researcher. Correct responses were given verbal praise (e.g., "Good!" or "That's Right!") and overcorrection procedures (having the child repeat the correct reading once) followed incorrect responses. The purpose of the posttest was to determine if there was a difference in the percent of mastered words maintained among the two conditions.

Dependent Variables

The dependent variables in this study included a measure of instructional effectiveness, a measure of instructional efficiency, and a measure of maintenance. The total number of words mastered across both conditions served as a measure of instructional effectiveness. Learning rate, a measure of instructional efficiency, was based on the number of words mastered per minute of instruction. For each session, learning rates were computed by multiplying the number of words mastered during that session by 60 seconds and then dividing the amount of instructional time (in seconds) spent under each respective condition during that session. For each condition, the number of words mastered per minute was added across sessions to obtain a measure of cumulative learning rates across sessions that could be compared to the instructional effectiveness data.

Maintenance rate was calculated by recording the number of sight words that each tutee pronounced correctly, multiplying the number of mastered words maintained by 60, and then dividing by the cumulative amount of instructional time (in seconds) spent in their respective condition (without interspersal and with interspersal).

Results

The results of the initial assessment showed that Student 1 had correctly read 33 of the 300 sight words, Student 2 correctly read 8 sight words, Student 3 correctly read 17 sight words, and Student 4 correctly read 15 sight words. Therefore, Student 1 had the highest amount of known sight words compared to the other tutees during the initial assessment.

Table 1 summarizes the findings for the participants in the without interspersal condition and Table 2 summarizes the findings for the participants in the interspersal condition. Both tables provide the cumulative number of words mastered for that condition, total time engaged in each condition, the rate (i.e., cumulative number of words mastered per minute of instruction) of sight word acquisition under both conditions by each participant, number of sight words maintained, percent of sight words maintained, rate of mastered words maintained, and totals across all participants for all variables. The data in Table 1 and in Table 2 indicate the overall cumulative learning measurement (i.e., total number of words learned). Students in the without interspersal group acquired the greater number of words, a total of 24 words. The students in the interspersal condition only learned a total of 10 words. The results of the cumulative learning measurement also indicated each individual student varied in the amount of words learned in both conditions.

When examining the amount of instructional time required in each condition (i.e., learning rate), the students in the without interspersal condition required 5.64 minutes less instructional time than the students in the interspersal condition. When learning rates for both conditions were compared, the students in the without interspersal condition had

a higher learning rate (.56) then the students in the interspersal condition (.21). It was also observed that the learning rates for each student and the amount of instructional time spent resulted in various total amounts of words mastered across both conditions. Therefore, it may be beneficial to keep these individual differences in mind when measuring the learning rates for each student. This may be an indication that students vary in their receptiveness of learning with this procedure.

Figures 1-4 show the cumulative number of words mastered for each student. For each student, there is a figure that has a vertical axis representing the cumulative number of words learned without regard to time. The horizontal axis for these figures represents each tutoring session. The data from these figures show inconsistent patterns of sight word acquisition within and between both conditions. However, the graphs showed there was a gradual upward trend for all students as sight word acquisition increased.

Figures 5-8 show the total number of cumulative words mastered with regard to time. For each student, there is a figure that has a vertical axis representing the total number of cumulative words mastered per minute of instruction. The horizontal axis represents each tutoring session. The data were plotted for each session rather than by minutes of instruction in order to compare the two methods of measurement on a session by session basis. The data showed that the learning rate was highest under the without interspersal condition. Within the without interspersal condition, learning rates appeared to increase steadily. Within the interspersal condition, the learning rates for those students were more varied and were lower, and the graphs indicate a more gradual upward trend than was found for the without interspersal condition.

Maintenance

Tables 1 and 2 display the number of words mastered (W), number of words maintained (WM), percentage of mastered words maintained (%WM), and mastery rate (MR) for each student in both conditions and the group total for that condition. The overall percentage of mastered words maintained was high, ranging from 75% to 100%. When instructional time was considered, the mastery rates for each student were comparable to their learning rates. It appeared that the students in the without interspersal group (who had higher learning rates and less instruction time) had higher maintenance percentages and maintenance rates. The data presented in Table 1 for the without interspersal condition indicated that Student 1's learning rate (.40) and mastery rate (.37) were similar and this student had 16 out of 17 mastered words maintained. Student 2's learning rate (.17) and mastery rate (.14) were also similar and this student had six out of seven mastered words maintained. Upon visual analysis of the data presented in Table 2 for the interspersal condition, it is demonstrated that Student 3's mastery rate (.12) was similar to the learning rate (.14). This student had six out of the eight words mastered maintained. Student 4's mastery rate (.04) and learning rate (.04) were the same. This student maintained both mastered words. These data are another example of the importance of considering how instructional conditions may affect student performance. For example, Student 1 who participated in the without interspersal condition, had less instructional time (42.15 minutes) than Student 4, who participated in the interspersal condition (47.79 minutes). Student 1 mastered 17 words and maintained 94% of words mastered, while Student 4 mastered and maintained only two words.

Discussion

The current study was an applied preliminary exploration of which condition (peer tutoring or peer tutoring with interspersal) was more effective in increasing sight word acquisition. The current study attempted to determine if there was a difference in the learning rate of sight words between the conditions. And lastly, this study explored whether there was a difference between the conditions in the percentage of sight words maintained. Results based upon effectiveness data (i.e., not considering the amount of instructional time involved to achieve the amounts of learning) demonstrated that the cumulative number of words mastered and maintained were greater in the without interspersal condition. However, analysis of efficiency data (i.e., the cumulative number of words mastered divided by the amount of instructional time) showed obvious differences in learning rates for all students. The students with the highest learning rates were in the without interspersal condition. Conversely, the students in the interspersal condition yielded the lowest learning rates.

This study was conducted during the first semester of the school year, which may have influenced the results. Since first grade students are just beginning to receive reading instruction in school, they may not have acquired the level of phonic skill necessary to sound out words, which made it difficult to read new words based solely upon hearing the correct pronunciation of the word. It should be noted that Student 1, who had the most known sight words during the initial assessment, also learned the most sight words during the study. This indicates that a student's initial level of skill may influence the effectiveness of an intervention.

Another finding that is important to note is that even though the interspersal condition required more time, the students in this condition learned fewer words. Adding known words before unknown words did not seem to have a positive impact on learning rates. In the without interspersal condition, students were presented with fewer words and may have become accustomed to the order of the words by repetition. Also, they were presented with more opportunities to learn new words. In the interspersal condition, positive reinforcement (i.e., verbal praise) did not seem to have a noticeable positive effect on the students' performance because the students in this condition were exposed to more opportunities for verbal praise (their word lists consisted of 10 known words and 10 unknown words) and learned less words than the students in the without interpsersal group.

Results of these findings also indicated that maintenance of mastered words may be somewhat related to rates of acquisition. The students' learning rates were seemingly similar to their maintenance rates. Therefore, the without interspersal condition yielded a higher percentage of sight words maintained.

The current study results lend some support to previous findings that opportunities to respond are important because they promote the acquisition and maintenance of skills and can enhance students' academic performance (Arreaga-Mayer, 1998; Coenen, 2002; Greenwood, et al., 1989; Skinner, 2002; Skinner, et al., 1996). The findings related to instructional efficiency data indicate that it is important to implement a procedure that would yield the best results, or higher amounts of learning, in the least amount of time. In this study, the student with the highest amount of learning was a participant in the condition that had less instructional time. Conversely, the student who

learned and maintained the least amount of words participated in the condition that had more instructional time. This is an indication that much of the variability found in the results may be due to individual differences in learning.

Additionally, this study yielded results that did not support previous findings indicating that greater amounts of unknown words to known words may in fact increase the information acquired (Roberts & Shapiro, 1996; Roberts, et al., 1991). Unlike previous research, this study did not generate any convincing data that interspersing brief, additional material among target material increased acquisition and retention of learned material (Neef, et al., 1977; 1980). In the current study, there were not only differences between both conditions in the number of words mastered per instructional time, but also to the number of words mastered within conditions. The results showed that the student who learned the least number of words was in the interspersal condition. Conversely, the student who learned the most words was in the without interspersal condition. The variability in the current results may be due to individual differences in how the students acquire information rather than the conditions implemented in the study. Therefore, the results indicate that academic interventions should be considerate of the needs and skill levels of the student in order to be successful.

Limitations and Future Research

The current study did provide unique results relative to the area of academic interventions. The experiment showed that an academic intervention that did not intersperse brief, additional material yielded greater benefits in terms of acquisition of learned material and higher learning rates. The current study provided evidence as to why learning rates must also be considered when choosing an intervention. In this study, the

student with the lowest learning rate was in the condition with more instructional time while the participant with the highest learning rate was in the condition that had less instructional time. Even though certain intervention conditions may be easy to implement, they may not always yield sufficient gains in learned material (Cates & Dalenberg, in press; Skinner, et al., 1996; Robinson & Skinner, 2002).

Though this study demonstrated interesting results, it does have a number of limitations. First, there were only four students that participated in the study as tutees. Therefore, it is difficult to ascertain whether the results from this study are valid, or really indicative of potential benefits due to the limited number of participants. Future research should have multiple dyads consisting of students that are at about the same ability level within both conditions and an alternate treatment design should be employed, or have the participants be exposed to both conditions of the study.

A second limitation concerns the limited number of sessions used to conduct the study. Perhaps with more sessions, the results could have provided a better estimate of sight word acquisition and learning rates. Future research should incorporate more sessions to see, if given more time, differentiation can be observed among sight word acquisition and learning rates.

A third limitation is the extent of phonic skills that the four tutees had acquired thus far. Out of the four tutees, only one of the tutees attempted to sound out the words. This student also acquired the highest amount of learned material. Future research should consider phonic skill as playing a critical part of any reading intervention or strategy. Before a sight word intervention in implemented, the students' current competency level

in phonic skill should be known since these interventions require phonic skills competency before they can be effective.

Another limitation is that teachers were not asked if students appeared to be doing better in reading. Therefore, it is difficult to tell whether this supplemental instruction increased students' reading performance in the classroom. Future research should evaluate whether supplemental instructional procedures do have an impact on reading performance in the classroom.

Finally, future research should concentrate on evaluating the interaction between efficiency and effectiveness data when evaluating interventions. An intervention that is very efficient in increasing acquisition of learned material, may also take a lot of effort to implement. Conversely, an intervention that requires little effort may also yield less efficient results. By evaluating learning rates, researchers can consider which interventions are increasing the amount of learned material in the least amount of time (Cates & Dalenberg, in press; Roberts & Shapiro, 1996; Roberts, et al., 1991; Skinner et al., 1996). The results of this study indicated that the peer tutoring without interspersal condition yielded higher learning rates within the least amount of time. Overall, the learning rates obtained in this study indicated that there was much variability among the students in both conditions. Due to the variability of the results in the current study, it would be beneficial to have additional documentation of learning rates of student performance within various student populations whose learning may be more affected by time issues (i.e., Mental Retardation, Learning Disabled).

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Appendix A

School District Approval of Proposed Research

Description of Research

This letter is to obtain your consent for students in this district to participate in an innovative research on how students' best learn sight words (most frequently used words in print). From this study, it is expected that information will be gained about how to most efficiently and effectively teach sight word reading to students. The Eastern Illinois University Ethics Committee has approved this study. This study will require the consent of a second grade teacher and six students and their parents. Two random students who demonstrate strong reading skills compared to their other classmates will be chosen as peer tutors. Four students who demonstrate weak reading skills compared to their other classmates will be chosen as tutees.

After receiving written consent from the school district, teacher, and parents of the students the researcher will take each individual student aside for an initial assessment of their knowledge of sight words. The sight words that are known and unknown for each student will determine what words will appear on the students' individualized word lists to be used in the intervention. The student tutees will then be randomly paired up with a student tutor. The tutor will use 3X5 flashcards with sight words printed on them (supplied by researcher). There will be two conditions in the study. Half of the peer tutoring dyads will be tutored using ten sight words that they did not know during the initial assessment. The other peer tutoring dyads will be tutored by having ten words they knew during the initial assessment interspersed between ten unknown words from the assessment. The sessions should last approximately 15 minutes

for the without interspersal condition and 20 minutes for the interspersal condition. There will be five or ten sessions depending upon time and scheduling concerns. The intervention will last either three or five weeks (based on the assumption the researcher will have two sessions a week). After the intervention, the researcher will take each student aside individually and administer a posttest. The posttest for each student will determine if there is a difference among the two conditions in the percentage of words maintained.

Research has not indicated the extent to which interspersal and peer tutoring can work together to enhance learning. By combining interspersal and peer tutoring interventions, students may demonstrate greater gains in learned material and accuracy of responses.

Please contact Jennifer Schultz for information or questions regarding approval for this study at (708) 341-0819 or via e-mail jschultzssp@hotmail.com or Dr. Christine McCormick at (217) 581-6410 or cfcem1@eiu.edu. We thank you for your help. For additional information regarding human participation in research, please contact the EIU Ethics Committee at (217) 581-2127.

Appendix B

Letter to Teachers

Description of Research

This letter is to obtain your consent for you and six students from your class to participate in an exciting research study in reading. From this study, it is expected that information will be gathered about how students may demonstrate greater gains in learned material and accuracy of responses.

This study takes an innovative approach to learning sight words. After receiving previous written consent from Eastern Illinois University Ethics Committee, School District, teachers, students' parents, and the students, the researcher will take each individual student aside for an initial assessment of their knowledge of sight words. The sight words that are known and unknown for each student will determine what words will appear on the students' individualized word lists to be used in the intervention. Two students from your class who demonstrate strong reading skills will be randomly chosen to participate in the study as peer tutors. Four other random students within the class that demonstrate weak reading skills when compared to others in the class will participate as student tutees. The student tutors will tutor the student tutees by using sight words that are printed on 3x5 flashcards. The student tutees will be in one of two experimental conditions: 1) sight word lists with all unknown words 2) sight word lists with known words interspersed after each unknown word. The intervention will last approximately three to five weeks based on the assumption of having two tutoring sessions per week. The intervention will consist of five or ten sessions, depending on how feasible the intervention would be to implement for the teacher/students. The sessions should last

approximately 15 minutes for the without interspersal condition and 20 minutes for the interspersal condition. The researcher and teacher will decide together upon what students would be best suited for the intervention based on reading performance. The teacher and researcher will also decide together what days/times would be best to conduct the intervention. After deciding upon times to conduct the intervention, the researcher and students will conduct the intervention in a room with at least two tables and enough chairs for everyone. During each session, students will be exposed to their respective list of sight words three times. The tutor will hold up flashcards in front of the tutee and the tutee is expected to attempt to pronounce the sight word. If the tutee pronounces a word incorrectly, the tutor will pronounce it for them and have the tutee repeat the correct pronunciation one time. The researcher will be sitting behind the tutors and will use a check off sheet to keep track of the tutees' performance. After the student has completed the list three times they will raise their hand. The researcher will use a stopwatch to measure the number of seconds it takes for each student to complete their lists.

After the intervention is completed, the researcher will take each student aside individually and administer a posttest. The posttest for each student will determine if there is a difference among the two groups in the percentage of words maintained.

Research has not indicated the extent to which interspersal and peer tutoring can work together to enhance learning. By combining interspersal and peer tutoring interventions, students may demonstrate greater gains in learned material and accuracy of responses.

If you are interested in participating in this study or if you have questions regarding this study, please return the following letter signed to the school psychologist's

mailbox or contact Jennifer Schultz at (708) 341-0819 or via e-mail jschultzssp@hotmail.com or Dr. Christine McCormick at (217) 581-6410 or cfcem1@eiu.edu. We thank you for your help. For additional information regarding human participation in research, please contact the EIU Ethics Committee at (217) 581-2127. We thank you for your willingness to participate in this innovative approach to learning.

Yes, I would like to participate in the study.

_____ _____

Signature Date

Appendix C

Letter to Students

Informed Assent

I am doing a project about reading. I hope this study will help people understand better how students learn how to read. Helping in this project is unlikely to result in any risk or harm to you. By participating in this project, your reading performance may get better or may not get better. I am asking you to volunteer as a participant in this study.

As a participant in this project, you will be asked to either hold up flashcards that have words on them for another student to read and will correct the student if they answer incorrectly **or** you will be asked to try and say the words that are on flashcards. How you do will be shared with you, your teacher, and your parents if they ask. Nobody else will know how you do. This is not a test. This project will take about twenty to thirty minutes of your time a couple of times a week. If you have questions about the project please ask your teacher, your parents or me. Your parents, teacher, and principle have already said it was o.k. if you want to participate.

Jennifer Schultz

School Psychology Intern

(708) 974-0217

1. I have been told about what will be done in the study. I understand that I will be asked to answer questions and to spell words
2. I understand that no one thinks that I will be uncomfortable or in danger in any way if I say yes.
3. I understand that I might do better in reading or I might not.

4. I understand that I can choose to quit at any time and not get in trouble or be punished.

Name:_____ Date:_____

Appendix D

Informed Consent

Dear Parent/Guardians,

This letter is to obtain your consent for your child to participate in an exciting research study in reading. From this study I expect that information will be gained about how to more efficiently and effectively teach basic reading skills to students. Participation in this study is unlikely to result in any risk to your child beyond that of everyday reading instruction. The Eastern Illinois University Ethics Committee, the school district, and your child's teacher will approve this study before it is conducted.

Your child will either be a peer tutor to another classmate **or** will be tutored by a fellow classmate. Before the beginning of the study, each of the six students that will be participating in this study will be taken aside individually by the researcher and will be given a list of 150 sight words (most common words that appear in print). After each initial assessment, the researcher will know what words were known and unknown to the student tutees. The researcher will then print these words on 3X5 flashcards. The student tutors will tutor the student tutees by using sight words that are printed on 3x5 flashcards. The student tutees will be in one of two experimental conditions: 1) sight word lists with all unknown words 2) sight word lists with known words interspersed after each unknown word. The intervention will last approximately three to five weeks based on the assumption of having two tutoring sessions per week. The intervention will consist of five or ten sessions, depending on how feasible the intervention would be to implement for the teacher/students. The sessions should last approximately 15 minutes for the without interspersal condition and 20 minutes for the interspersal condition.

Research has not indicated the extent to which interspersal and peer tutoring can work together to enhance learning. By combining interspersal and peer tutoring interventions, students may demonstrate greater gains in learned material and accuracy of responses.

The persons that may have access to your child's performance and answers will be your child's teacher, your child, their peer tutor, and you will have access to this information. No other students or any other person's will see his/her performance scores. The study will require only about 15 to20 minutes of your child's time twice a week during tutoring time at your child's school.

If you have questions regarding this study, please contact Jennifer Schultz at (708) 341-0819 or via e-mail jschultzssp@hotmail.com or Dr. Christine McCormick at (217) 581-6410 or cfcem1@eiu.edu. We thank you for your help. For additional information regarding human participation in research, please contact the Eastern Illinois University Ethics Committee at (217) 581-2127. We thank you for your willingness to participate in this innovative approach to learning.

I give consent for _____ to participate in this study.

(Child's First and Last Names)

Signature:_____ Date:_____

(parent/guardian)

Appendix F

Tutee Initials: DAILY CHECK OFF SHEET

Date:_____ Session # _____ Completion Time_____Intsp? Y N

C = Correct X = Incorrect NR = No Response

Trial #1				Trial # 2			
1. _____	C	X	NR	1. _____	C	X	NR
2. _____	C	X	NR	2. _____	C	X	NR
3. _____	C	X	NR	3. _____	C	X	NR
4. _____	C	X	NR	4. _____	C	X	NR
5. _____	C	X	NR	5. _____	C	X	NR
6. _____	C	X	NR	6. _____	C	X	NR
7. _____	C	X	NR	7. _____	C	X	NR
8. _____	C	X	NR	8. _____	C	X	NR
9. _____	C	X	NR	9. _____	C	X	NR
10. _____	C	X	NR	10. _____	C	X	NR

Trial #3

1. _____	C	X	NR	
2. _____	C	X	NR	
3. _____	C	X	NR	
4. _____	C	X	NR	
5. _____	C	X	NR	
6. _____	C	X	NR	
7. _____	C	X	NR	
8. _____	C	X	NR	
9. _____	C	X	NR	
10. _____	C	X	NR	Total correct: _____

Appendix F

Tutee Initials: DAILY CHECK OFF SHEET

Date:_____ Session # _____ Completion Time_____Intsp? Y N

C = Correct X = Incorrect NR = No Response

Trial #1				Trial # 2			
1. _____	C	X	NR	1. _____	C	X	NR
2. _____	C	X	NR	2. _____	C	X	NR
3. _____	C	X	NR	3. _____	C	X	NR
4. _____	C	X	NR	4. _____	C	X	NR
5. _____	C	X	NR	5. _____	C	X	NR
6. _____	C	X	NR	6. _____	C	X	NR
7. _____	C	X	NR	7. _____	C	X	NR
8. _____	C	X	NR	8. _____	C	X	NR
9. _____	C	X	NR	9. _____	C	X	NR
10. _____	C	X	NR	10. _____	C	X	NR
11. _____	C	X	NR	11. _____	C	X	NR
12. _____	C	X	NR	12. _____	C	X	NR
13. _____	C	X	NR	13. _____	C	X	NR
14. _____	C	X	NR	14. _____	C	X	NR
15. _____	C	X	NR	15. _____	C	X	NR
16. _____	C	X	NR	16. _____	C	X	NR
17. _____	C	X	NR	17. _____	C	X	NR
18. _____	C	X	NR	18. _____	C	X	NR
19. _____	C	X	NR	19. _____	C	X	NR
20. _____	C	X	NR	20. _____	C	X	NR

Tutee Initials: Date:

Trial #3

1. _____	C	X	NR	
2. _____	C	X	NR	
3. _____	C	X	NR	
4. _____	C	X	NR	
5. _____	C	X	NR	
6. _____	C	X	NR	
7. _____	C	X	NR	
8. _____	C	X	NR	
9. _____	C	X	NR	
10. _____	C	X	NR	Total correct: _____
11. _____	C	X	NR	
12. _____	C	X	NR	
13. _____	C	X	NR	
14. _____	C	X	NR	
15. _____	C	X	NR	
16. _____	C	X	NR	
17. _____	C	X	NR	
18. _____	C	X	NR	
19. _____	C	X	NR	
20. _____	C	X	NR	

Appendix E
Fry Instant Word List (1980)

First Hundred

a	can	her	many	see	us
about	come	here	me	she	very
after	day	him	much	so	was
again	did	his	my	some	we
all	do	how	new	take	were
an	down	I	no	that	what
and	eat	if	not	the	when
any	for	in	of	their	which
are	from	is	old	them	who
as	get	it	on	then	will
at	give	just	one	there	with
be	go	know	or	they	work
been	good	like	other	this	would
before	had	little	our	three	you
boy	has	long	out	to	your
but	have	make	put	two	
by	he	man	said	up	

Second Hundred

also	color	home	must	red	think
am	could	house	name	right	too
another	dear	into	near	run	tree
away	each	kind	never	saw	under
back	ear	last	next	say	until
ball	end	leave	night	school	upon
because	far	left	only	seem	use
best	find	let	open	shall	want
better	first	live	over	should	way
big	five	look	own	soon	where
black	found	made	people	stand	while
book	four	may	play	such	white
both	friend	men	please	sure	wish
box	girl	more	present	tell	why
bring	got	morning	pretty	than	year
call	hand	most	ran	these	
came	high	mother	read	thing	

Third Hundred

along	didn't	food	keep	sat	though
always	does	full	letter	second	today
anything	dog	funny	longer	set	took
around	don't	gave	love	seven	town
ask	door	goes	might	show	try
ate	dress	green	money	sing	turn
bed	early	grow	myself	sister	walk
brown	eight	hat	now	sit	warm
buy	every	happy	o'clock	six	wash
car	eyes	hard	off	sleep	water
carry	face	head	once	small	women
clean	fall	hear	order	start	write
close	fast	help	pair	stop	yellow
clothes	fat	hold	part	ten	yes
coat	fine	hope	ride	thank	yesterday
cold	fire	hot	round	third	
cut	fly	jump	same	those	

Table 1
Cumulative Number of Words Mastered (W), Number of Minutes Spent in Each Condition (Time), Learning Rates, Number of Words Maintained, Percentage of Mastered Words Maintained (%WM), and Rate of Mastered Words Maintained (MR) for Each Student and Group Total for the Without Interspersal Condition

	Without Interspersal Condition					
	W	Time[a]	Rate[b]	WM	%WM	MR[c]
Student 1	17	42.15	.40	16	94%	.37
Student 2	7	42.15	.17	6	86%	.14
Group	24	42.15	.56	22	90%	.52

[a]number of minutes. [b]number of words mastered/time. [c]number of mastered words maintained/time.

Table 2
Cumulative Number of Words Mastered (W), Number of Minutes Spent in Each Condition (Time), Learning Rates, Number of Words Maintained, Percentage of Mastered Words Maintained (%WM), and Rate of Mastered Words Maintained (MR) for Each Student and Group Total for the Interspersal Condition

	Interspersal Condition					
	W	Time[a]	Rate[b]	WM	%WM	MR[c]
Student 3	8	47.79	.14	6	75%	.12
Student 4	2	47.79	.04	2	100%	.04
Group	10	47.79	.21	8	87.5%	.17

[a]number of minutes. [b]number of words mastered/time. [c]number of mastered words maintained/time.

Figure 1

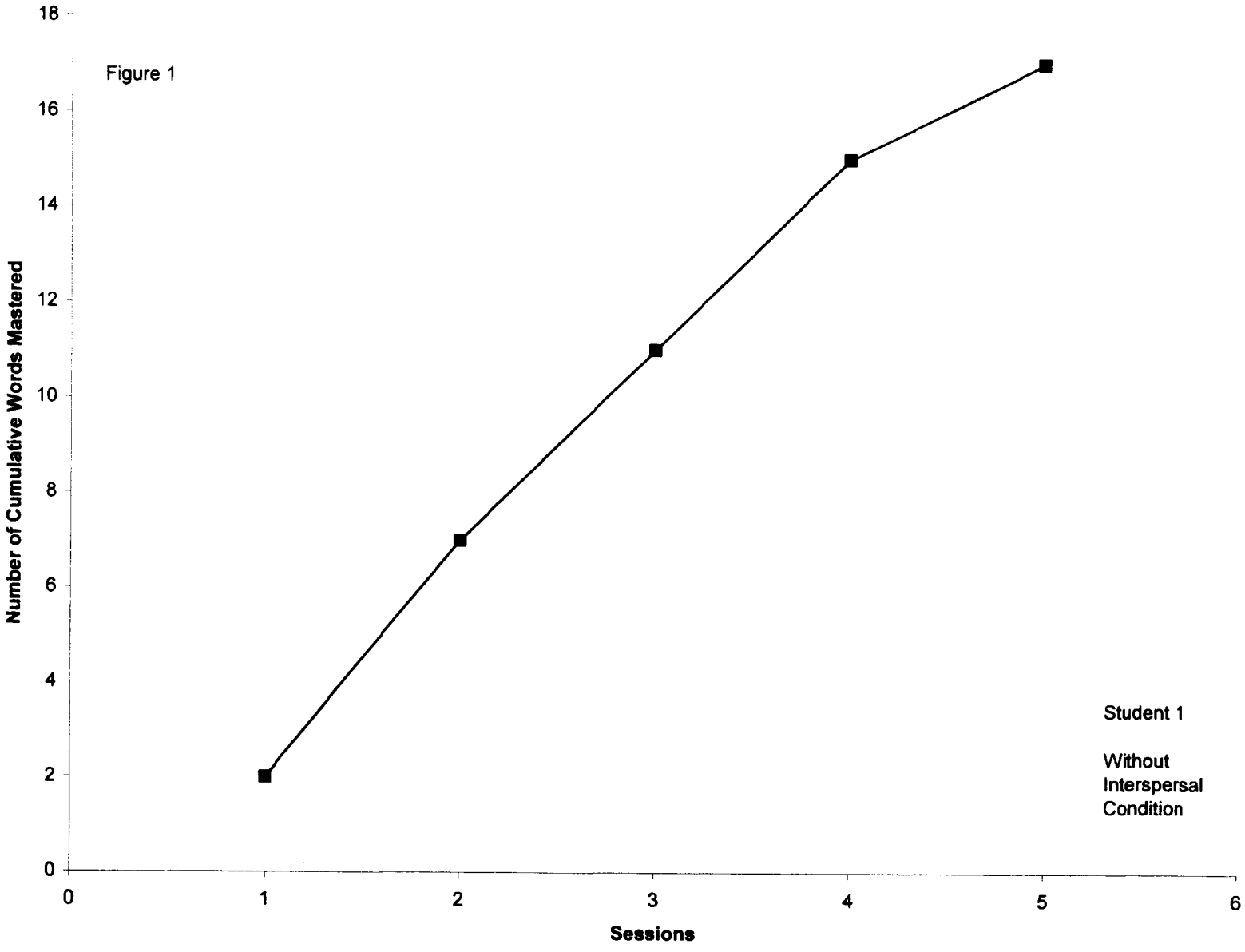
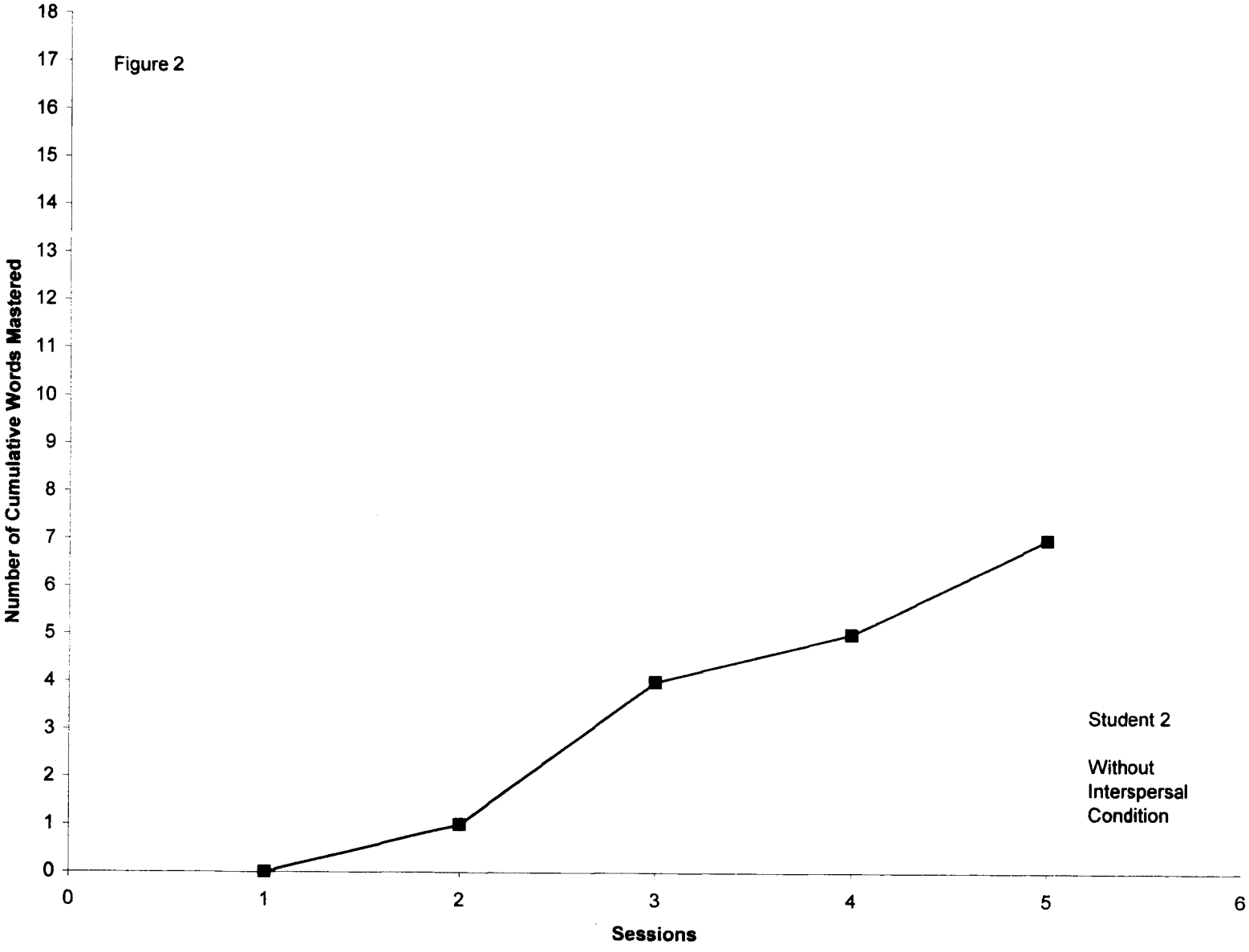

18
16
14
12
10
8
6
4
2
0
Number of Cumulative Words Mastered
0
1
2
3
4
5
6
Sessions
Student 1
Without
Interspersal
Condition

Figure 2


Number of Cumulative Words Mastered
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
5
6
Sessions
Student 2
Without Interspersal Condition

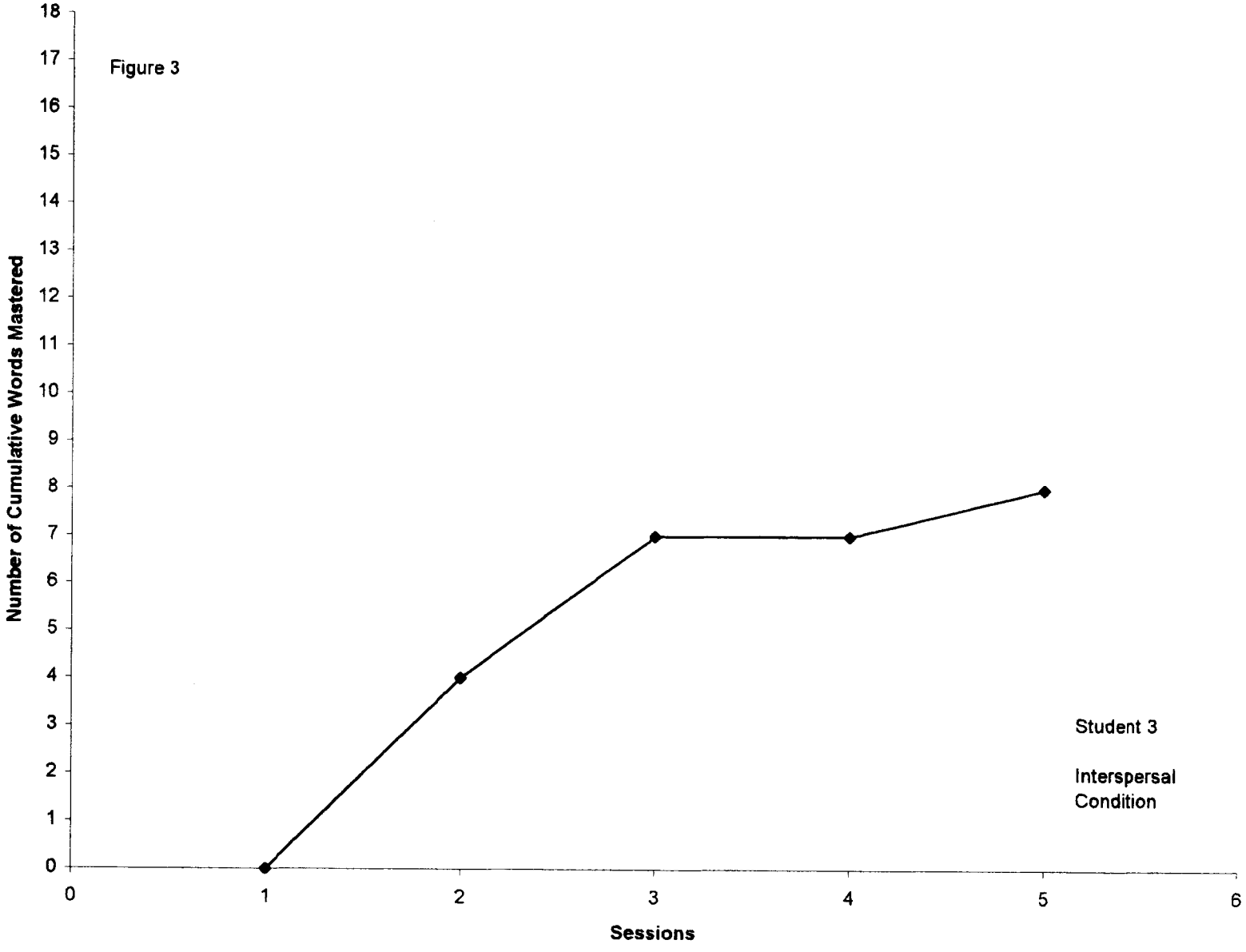


Figure 3
Number of Cumulative Words Mastered
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
5
6
Sessions
Student 3
Interspersal
Condition

Figure 4

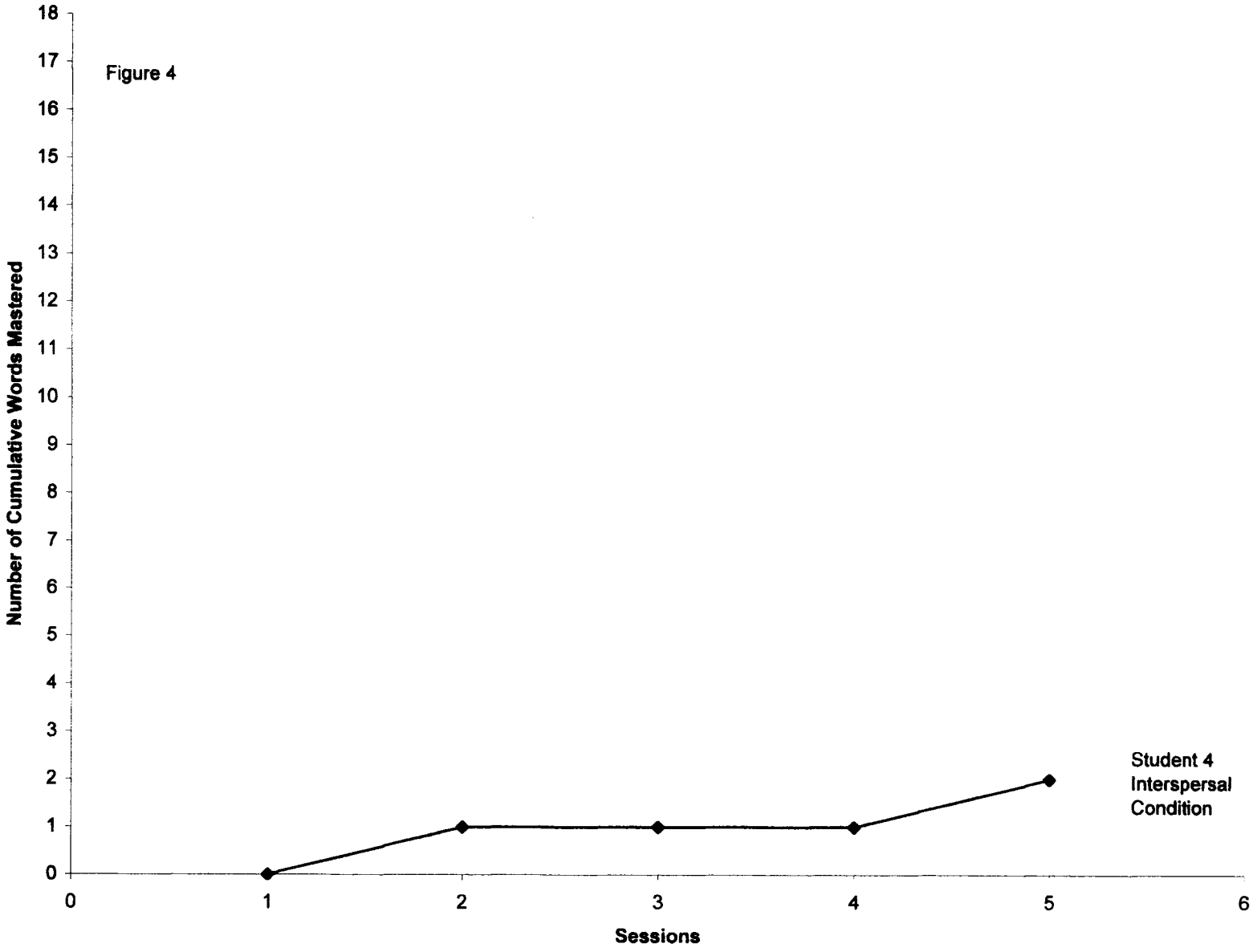

Number of Cumulative Words Mastered
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
5
6
Sessions
Student 4
Interspersal
Condition

Figure 5

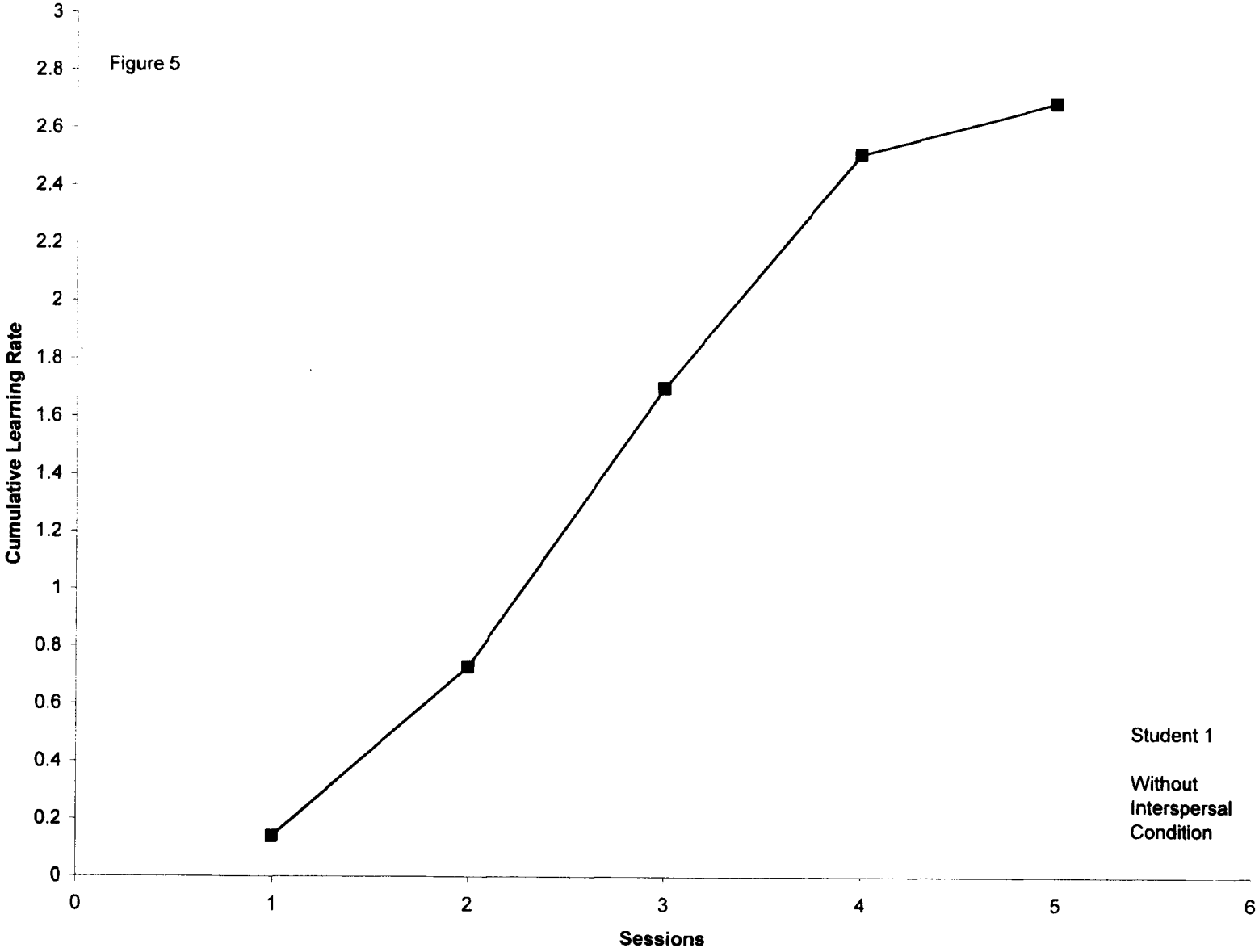

Cumulative Learning Rate
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
Sessions
Student 1
Without Interspersal Condition

Figure 6

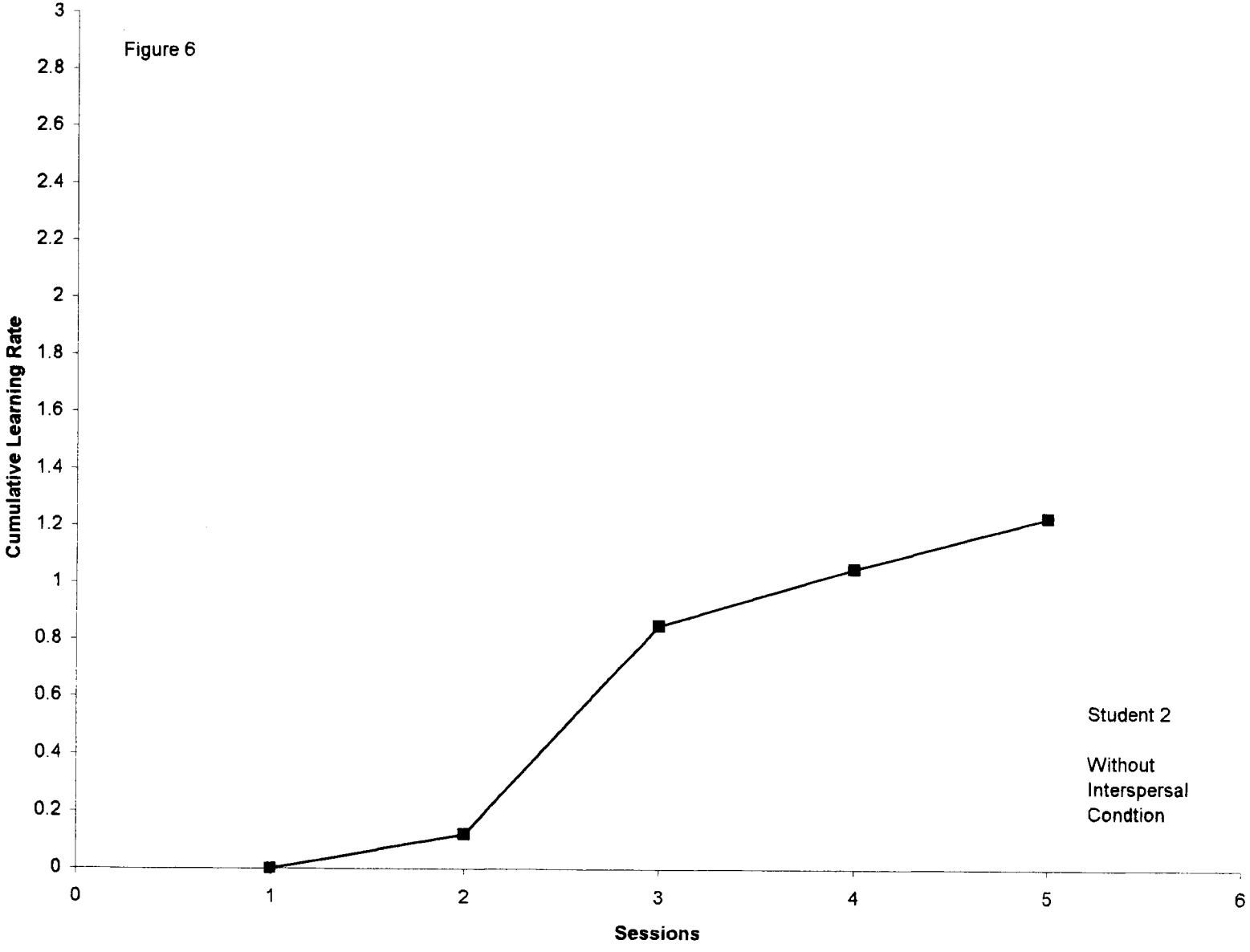

Cumulative Learning Rate
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
Sessions
Student 2
Without
Interspersal
Condtion

Figure 7

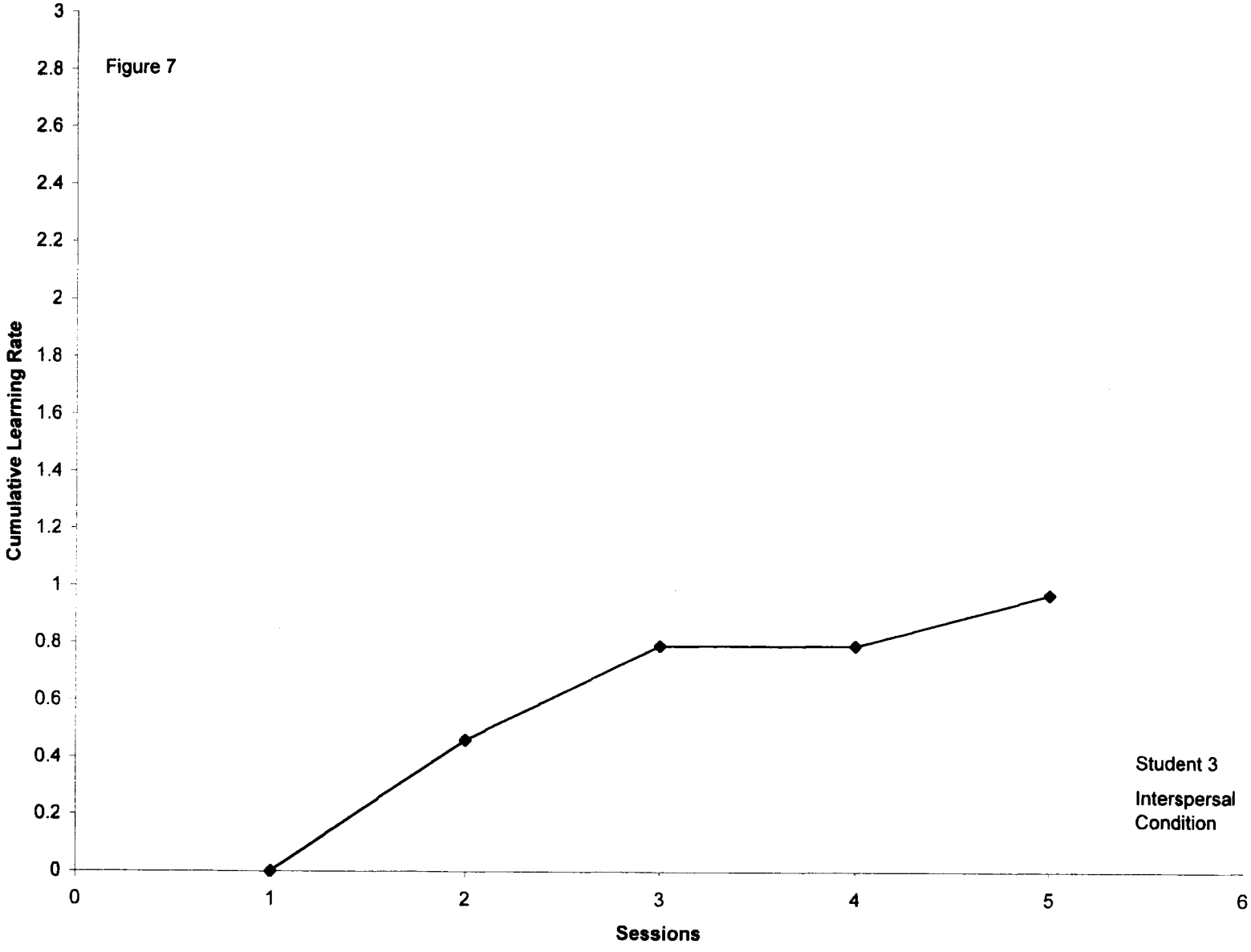
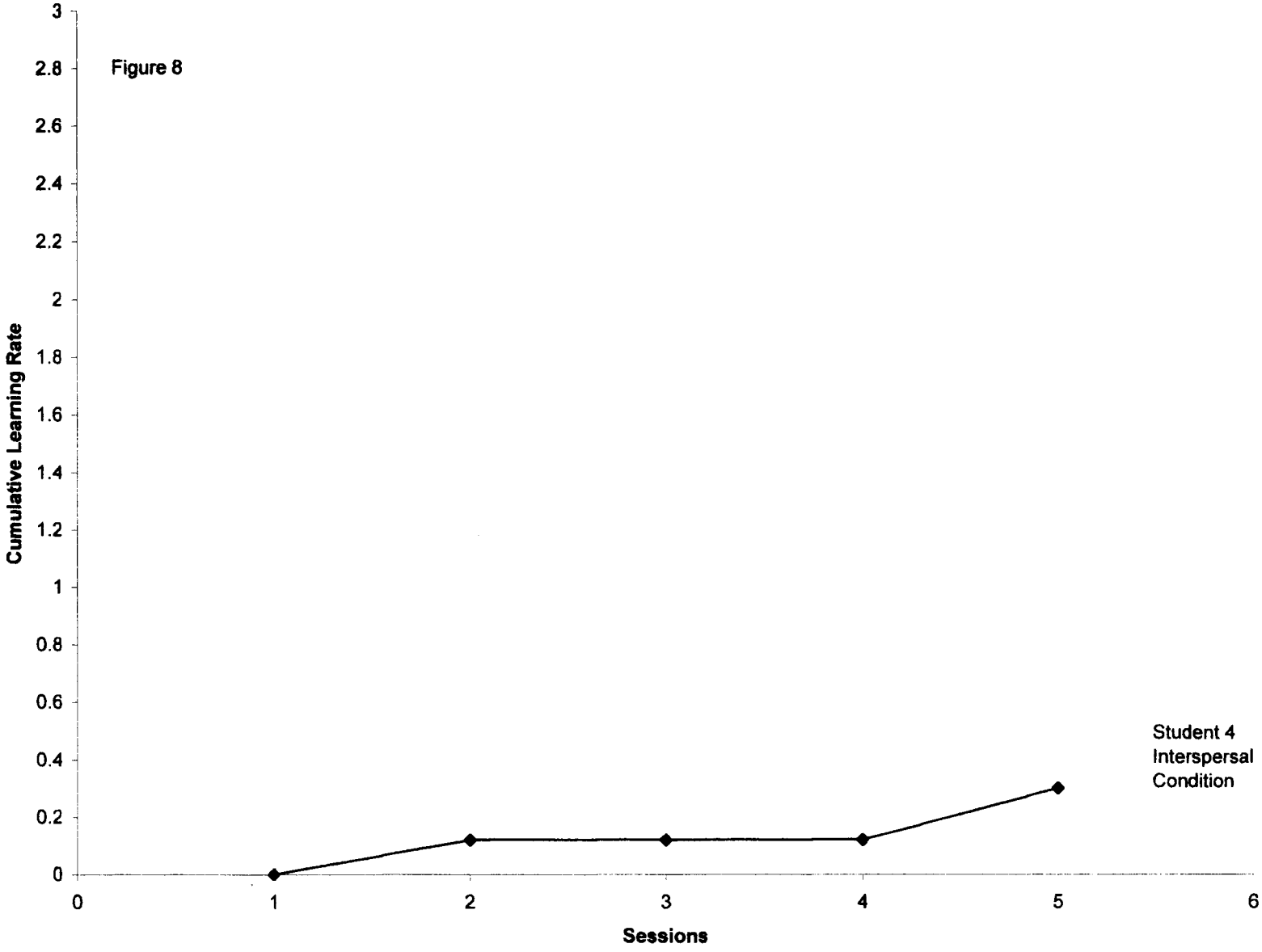

Cumulative Learning Rate
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
Sessions
Student 3
Interspersal
Condition

Figure 8


Cumulative Learning Rate
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
Sessions
Student 4
Interspersal
Condition